

The diatom type slides and bibliography of John Carter (1908–1993)

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SYNOPSIS. An inventory of John Carter's diatom type slides is given along with a complete bibliography. Details of the whereabouts of Carter's type slides are included along with their geography, references to sources of additional illustrations, and nomenclatural notes.

INTRODUCTION

'In the heighday of the amateur naturalist nearly everyone who possessed a microscope, however humble the instrument, treasured in his cabinet of slides a few diatom specimens' (Carter, 1971b: 66). So wrote John Carter in a short but significant piece on the role of amateur diatomists and the legacy of good specimen collections (Carter, 1971b). After his death in 1993 (Marson, 1994; Hartley, 1994), Carter's diatom collection was donated to The Natural History Museum, where it now resides. Carter's collections have added significantly to the data on the British diatom flora, of which Carter's collection is largely composed. In all, the collection consists of some 5000 microscope slides and 4000 bottled samples, along with a variety of notebooks and a card index. The early part of the collection consists of representative material from Rev. Dingley Fuge, an early inspiration for Carter. This material consists of some 1200 bottles that were never made into slides for Carter's collection. Fuge's collection will be the subject of a further paper.

The documentation included with the material makes the collections relatively easy to work with and, along with the recently published collection of drawings (Sims, 1996), forms a major record for the British freshwater diatom flora, spanning a period of six decades (1930–1990).

Carter did not just study the British diatom flora but made a contribution to diatom taxonomy in many areas of the world, including places that have never received attention before. As a consequence of these activities, as well as the detailed study of the British flora, Carter inevitably described a large number of new taxa.

This paper presents a compilation of all new taxa Carter described with details of type specimens and slides. In most cases it was relatively easy to trace the holotype specimen(s) if it was not stated at the time of publication. In Carter's earlier papers where the holotype was not usually cited, slides that may be types have been noted. In most cases a lectotype has not been selected, as that task is best left to those more familiar with the particular diatom under consideration. In some cases, for instance, the comprehensive *Süßwasserflora von Mitteleuropa* (Krammer & Lange-Bertalot, 1986–1991), lectotypes have already been selected and these are indicated in the text below.

In some early papers, Carter noted that some slides were sent to the Quekett Microscopical Society Club. A preliminary examination of those collections has not revealed the material. We have marked these types as 'holotype?' simply because, if found, the Quekett material may very well be the holotype. In most cases we have discovered identical material in the NHM collections which may serve as lectotypes should the need arise.

The nomenclature has been revised in cases where necessary.

CARTER'S NEW TAXA: TYPES AND ILLUSTRATIONS

Achnanthes Bory 1822

A. aperta J.R. Carter in J.R. Carter & Bailey-Watts 1981: 529, pl. 2, fig. 8.

Holotype: 'collection Carter, Shet. No. 68a' = BM 87975.

Locality: 'In Chumlie Loch, Shetland.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 113, taf. 89, figs 13–13') as *Achnanthes oestrupii* var. *aperta* (J.R. Carter) Lange-Bert., '...Holotypus, Coll. Carter Shetland 65A [sic, 68a], Chumlie Loch'; Krammer & Lange-Bertalot (1991a: 82, 344, taf. 48, figs 15–16) as *Achnanthes oestrupii* var. *aperta* (J.R. Carter) Lange-Bert., '...Holotypus'; Sims (1996: 18–19, fig. 3; 2 images).

Note: Lange-Bertalot & Krammer (1989: 113) place this taxon in *Achnanthes oestrupii* var. *aperta* (J.R. Carter) Lange-Bert.

A. atalanta J.R. Carter 1966: 444, pl. 1, figs 15–16, 19–20.

Syntypes: BM 77591-2.

Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae ... Sample No. 6. Crater Lake, on moss, 6500 feet above sea level.' [BM 77591] 'Sample No. 7. As number 6 but on algae.' [BM 77592].

Additional illustrations: Lange-Bertalot & Krammer (1989: 23, 63, 204, taf. 19, figs 21–25'), as a possible synonym of *Achnanthes helvetica* (Hust.) Lange-Bert., 'Typenpräp. BM 77591, Tristan da Cunha.'

- A. cassida* J.R. Carter 1970b: 608, pl. 1, figs 17–18.
Holotype: BM 77780.
Locality: ‘Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.’
Additional illustrations: Lange-Bertalot & Krammer (1989: 37, 133, taf. 48, figs 9–21), ‘...Holotypus (von *A. cassida*) BM 77780...’ as *Achnanthes rossi* Hust.
Note: Bukhtiyarova & Round (1996: 12) place this taxon in *Psammothidium rossi* (Hust.) Bukht. & Round.
- A. curtissima* J.R. Carter 1963: 200, pl. 1, fig. 3.
Holotype: Not given.
Lectotype: BM 93606. Carter 2630 ‘Fell Loch Wigstoun-shire, 3/63’, see below.
Locality: ‘Fell Loch, Wigtownshire. Fresh water, probably not a rare form.’
Additional illustrations: Krammer & Lange-Bertalot (1991a: 21, 344, taf. 11, fig. 8), ‘Holotypus, coll. Carter 2630, Schottland’ = BM 93606. Slide marked as lectotype by Carter. It is worth noting that on slide 4774 (BM 96179, ‘Sheigra, Shetland, Bog’) Carter wrote in his index ‘I still have difficulty with this form [*A. curtissima*]. These specimens are my idea of it.’ This material is not related to type material; Sims (1996: 20–21, pl. 2, fig. 13, 4 images).
- A. didyma* f. *gibbosa* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 530, pl. 23, figs 17–18.
Holotype: Not given.
Locality: Not given.
Additional illustrations: Sims (1996: 22–23, pl. 3, fig. 3A, 2 images).
Note: As synonym of *A. rosenstockii* Lange-Bert. (Lange-Bertalot & Krammer, 1989: 131, no illustrations).
- A. exiloides* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 532, pl. 1, figs 40–43.
Holotype: ‘collection Carter, Shet. No. 35’ = BM 87947.
Locality: ‘In Kirk Loch, Shetland.’
Additional illustrations: Lange-Bertalot & Krammer (1989: taf. 67, figs 20–23) as ‘*A. expressa* Carter (syn. *A. exiloides* Carter)...Holotypus, Coll. Carter, Kirk Loch/Shetland’; Krammer & Lange-Bertalot (1991a: taf. 31, figs 13–18), ‘Typenpräparat von *A. exiloides* Carter nom. nov. = *A. expressa* ...’; Sims (1996: 22–23, pl. 3, fig. 10, 2 images).
Notes: Noted in Lange-Bertalot & Krammer (1989: 55) as ‘*A. expressa* Carter in litt.’ and in Krammer & Lange-Bertalot (1991a) as ‘*A. expressa* Carter nom. nov.’ but, in fact, the correct citation is *A. expressa* J.R. Carter in Hartley (see below).
- A. expressa* J.R. Carter in Hartley 1986: 606 = *A. exiloides* J.R. Carter in J.R. Carter & Bailey-Watts (1981) non *A. exiloides* Chlonoky (1963).
- A. fugeii* J.R. Carter 1963: 203, pl. 1, fig. 7.
Holotype?: Slides in Quekett Microscopical Society Collections.
Locality: ‘Estuary of the Forth. Probably a brackish water form.’
Additional illustrations: Lange-Bertalot & Krammer (1989: 58, taf. 32, figs 24–24), ‘Coll. Carter 39A, Burkwel/Shetland.’ Not type material; Sims (1996: 24–25, pl. 4, fig. 7, 2 images).
Note: There are no relevant slides in Carter’s collection.
- A. fulla* J.R. Carter 1970b: 608, pl. 1, figs 19–20.
Holotype: BM 77780.
Locality: ‘Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic ... collected by Mr. J. Broadhead during the summer of 1966 and 1967.’
- Additional illustrations*: Lange-Bertalot & Krammer (1989: 59, taf. 67, figs 1–6), ‘Holotypenpräp. BM 77780, Pyrenäen/Andorra.’
- A. hirta* J.R. Carter 1970b: 609, pl. 1, figs 10–11.
Holotype: BM 77780.
Locality: ‘Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.’
Additional illustrations: Lange-Bertalot & Krammer (1989: 65, taf. 40, figs 10–12), ‘Holotypus, BM 77780, Andorra’, taf. 31, figs 3–4, ‘...Population aus den Pyrenäen/Andorra (leg. J. Carter)’; Krammer & Lange-Bertalot (1991a: taf. 18, figs 1–4), ‘Holotypus von *A. hirta* Carter, Andorra.’
- A. interrupta* J.R. Carter 1961b: 18, figs 49–50.
Holotype: Not given.
Locality: ‘Found in Strath Farrar in a sphagnum bog at 2000 feet above sea level.’
Notes: Three slides in Carter’s BM collection seem appropriate for selection of a lectotype: BM 93089, ‘W Strath Farrar, 2276’, BM 93090, ‘Strath Farrar, 2276A’, BM 93091, ‘N Strath Farrar, 2276F’. These slides are from the same material (Carter 2276) although in the accompanying notebook the drawings given in the publication are not included in the notes for sample 2276.
- A. investians* J.R. Carter 1966: 445, pl. 1, figs 23–28.
Lectotype: BM 77587. After Lange-Bertalot & Krammer (1989; see below).
Syntypes: BM 77588, BM 77593, BM 77594.
Locality: ‘In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 2. Above Burntwood, stream at 1800 feet above sea level.’ [BM 77587] ‘Sample No. 3. As number 2 but a little upstream in a pool’ [BM 77588] ‘Sample No. 8. Salt beach at sea level.’ [BM 77593] ‘Sample No. 9. Hottentot Gulch, stream pool, 2000 feet above sea level.’ [BM 77594].
Additional illustrations: Carter (1966: 483) as *A. investians* n. sp. forma, pl. 8, figs 13–14 ‘...form from Gough Island sample 12...Gough Island sample 1006, Steam Gonydale, 1400 feet a.s.l.’ [BM 77600]. Lange-Bertalot & Krammer (1989: 71, taf. 18, figs 27–29), ‘Typenpräp. BM 77587, Tristan da Cunha’.
Note: Bukhtiyarova & Round (1996: 26) place this taxon in *Psammothidium investians* (J.R. Carter) Bukht. & Round.
- A. lanceolata* f. *rhombica* J.R. Carter 1966: 446, pl. 1, figs 17–18.
Holotype: BM 77586.
Locality: ‘Sample No. 1. Pigbite, stones in running water at sea level.’
- A. lintonensis* J.R. Carter 1961a: 325, figs 15–16.
Holotype: Not given.
Locality: ‘This species is rare and local to areas of the Cheviots.’
Additional illustrations: Sims (1996: 26–27, pl. 5, fig. 11, 2 images).
Note: One slide in Carter’s collection might be an appropriate lectotype: BM 94111, ‘Cheviots, 3019’.
- A. lucana* J.R. Carter 1970b: 609, pl. 1, figs 8–9.
Holotype: BM 77780.
Locality: ‘Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.’
- A. microcephala* f. *scotia* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 534, pl. 1, fig. 31.

Holotype: Not given.

Locality: Not given.

Lectotype: BM 94890 (Carter 3665), after Lange-Bertalot in Lange-Bertalot & Krammer (1989: 300). Carter noted on slide 3665 'fo. *scotia* in plenty.'

Locality: Ardislaigh Lochan, June '76.

Additional illustrations: Lange-Bertalot & Krammer (1989: 106, taf. 55, figs 11–12), as *Achnanthes minutissima* var. *scotica* (J.R. Carter) Lange-Bert., '*Achnanthes microcephala* f. *scotia* Carter, Coll. Carter 3665.' = BM 94890 and Taf. 67, figs 35–36, 'Coll. Carter 3665 Ardislaigh Lochan/Schottland.' = BM 94890; Krammer & Lange-Bertalot (1991a, taf. 31, figs 1–6), 'Coll. Carter aus Schottland und Brunnsee/Oberbayern.' [Not indicated which figures are from Carter material.]

Notes: Lange-Bertalot & Krammer (1989: 106) placed this taxon in *Achnanthes minutissima* var. *scotia* (J.R. Carter) Lange-Bert. and later elevate it to species-level, as *Achnanthes scotia* (J.R. Carter) Lange-Bert. (Lange-Bertalot, 1993: 8). However, *Achnanthes scotia* had already been used by Flower & Jones (1989: 228) hence Lange-Bertalot proposed the substitute name *Achnanthes caledonica* Lange-Bert. in Lange-Bertalot & Moser (1994: 95).

A. minima J.R. Carter 1961b: 21, figs 65–66.

Holotype: Not given.

Locality: 'I have found this species in Perthshire and Galloway but only as single cells.'

A. miota J.R. Carter & Denny 1982: 286, pl. 1, fig. 9.

Holotype: BM 78107.

Locality: 'River Jong (Taia) at Njala [Sierra Leone] ... phytoplankton.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 107, taf. 87, figs 5–9) as *Achnanthes lanceolata* var. *apiculata* R.M. Patrick, '...Typenpräp. BM 78107, Sierra Leone'; Krammer & Lange-Bertalot (1991a: taf. 46, figs 19–21), 'Typenpräp. Sierra Leone/Afrika.'

Note: As *Achnantheopsis miota* (J.R. Carter) Lange-Bertalot (1997: 207) and *Planothidium miotum* (J.R. Carter) Lange-Bertalot (1999: 278), the latter being the current, accepted name.

A. natrata J.R. Carter 1966: 446, pl. 1, figs 1–2.

Holotype: BM 77593.

Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae ... Sample No. 8. Salt beach at sea level.'

A. parallela J.R. Carter 1963: 200, pl. 1, fig. 4.

Holotype?: Slides in Quekett Microscopical Society Collections. *Syntype*?: BM 93945 = Carter 2904, 'Lindean – on Burrweed', specimen marked.

Locality: 'Well distributed but never in plenty in the hill lochs of the Southern Scottish uplands and the mountainous districts of south-west Scotland.'

Additional illustrations: Krammer & Lange-Bertalot (1991a: taf. 37, figs 24–27), 'Coll. Carter 2904, Schottland' as *A. petersenii* Hust.; Sims (1996: 32–33, pl. 8, fig. 5, 4 images).

Notes: *A. sonyda* J.R. Carter = *A. parallela* J.R. Carter non *A. parallela* Castr. (1886). As *Achnanthes petersenii* Hust. in Lange-Bertalot & Krammer (1989: 117). Carter 2904 is noted on Carter's card file as 'type material' and in the accompanying notebook as 'Pub as parallela JQMC 1963 Vol. 29.'

A. perfida J.R. Carter 1963: 200, pl. 1, fig. 2.

Holotype?: Slides in Quekett Microscopical Society Collections.

Locality: 'Loch Hempton on the surface of peat, fresh water, not common.'

Additional illustrations: Sims (1996: 30–31, pl. 7, fig. 5, 2 images).

Notes: See *Navicula perfidissima* Lange-Bert. There are two slides in Carter's collection which may also be type material: BM 93425, 'Loch Hempton, 2497, BM 93597, 'Loch Hempton, on Weed, 2625, 5/63'.

A. pericava J.R. Carter 1966: 447, pl. 1, figs 5–8.

Holotype: BM 77593.

Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae...Sample No. 8. Salt beach at sea level.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 116, 162, taf. 79, figs 40–44'), 'Holotypus, BM 77593, Tristan da Cunha.'; Krammer & Lange-Bertalot (1991a: taf. 40, figs 14–16), 'Holotypus, Tristan da Cunha.'

Note: As *Achnantheopsis pericava* (J.R. Carter) Lange-Bert. (1997: 207) and *Planothidium pericavum* (J.R. Carter) Lange-Bert. (1999: 278), the latter being the current, accepted name.

A. piafica J.R. Carter & Denny 1982: 286, pl. 1, fig. 10.

Holotype: BM 78108.

Locality: 'River Jong (Taia) at Njala [Sierra Leone] ... phytoplankton.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 119, taf. 85, fig. 9 and taf. 87, fig. 10), both 'Typenpräp. BM 78108, Sierra Leone.'

Note: Possible synonym of *Achnanthes lanceolata* var. *rostrata* (Østrup) Hust. according to Lange-Bertalot & Krammer (1989: 90).

A. pictii J.R. Carter 1963: 203, pl. 1, fig. 8.

Holotype?: Slides in Quekett Microscopical Society Collections.

Locality: 'Solway mud flats, not uncommon.'

Notes: Synonym of *Achnanthes linkei* Hust. (Lange-Bertalot & Krammer, 1989: 97, see also p. 119). There are two slides in Carter's BM collection which may also be type material: BM 93583, 'Solway, Mud flats, 2623, 5/63', BM 93584, 'Solway, Mud flats, 2623a, 5/63.'

A. plana J.R. Carter 1963: 201, pl. 1, fig. 6.

Holotype: Not given.

Lectotype: BM 93605 = Carter 2629, 'L. Eidrig, 5/63', marked on Carter's card file as 'type slide'.

Locality: 'Loch Eidrig, fresh water, very rarely.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 90, 120, taf. 88, figs 22–23), '...Holotypus, Coll. Carter 2629 Loch Eidrig/Schottland' as *Achnanthes lanceolata* var. *robusta* Hust.; Sims (1996: 30–31, pl. 7, fig. 7, 2 images).

A. pseudoswazi J.R. Carter 1963: 201, pl. 1, fig. 5.

Holotype: Not given.

Locality: 'Perhaps widely distributed in the larger northern lakes but always odd cells. I have it from regions as far apart as L. Tummel in the north to the Border Country.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 25, taf. 45, figs 37–38), not type material; Krammer & Lange-Bertalot (1991a: taf. 24, figs 1–2), 'Holotypus.' Krammer & Lange-Bertalot do not identify a holotype and, as it was not given in the original description, these illustrations may not be from type material; Sims (1996: 30–31, pl. 7, fig. 12, 3 images).

Note: Bukhtiyarova & Round (1996: 20) place this taxon in *Psammothidium pseudoswazi* (J.R. Carter) Bukht. & Round.

A. pyropa J.R. Carter 1970b: 610, pl. 1, figs 1–2.

Holotype: BM 77780.

Locality: 'Sample No. 2 from a ditch near Llorts which is in the

- only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
- Additional illustrations:* Lange-Bertalot & Krammer (1989: 128, taf. 67, figs 19–19'), 'Coll. Carter 13926, Pyrenäen/Andorra' = BM 77780.
- A. *saccula*** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 535, pl. 24, fig. 6.
Holotype: 'collection Carter, Shet. No. 25.' = BM 87942.
Locality: 'At Punds, Shetland.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 134, taf. 27, figs 20–20'), 'Holotypus, Coll. Carter Shetland 25, "Punds"' = BM 87942; Krammer & Lange-Bertalot (1991a: taf. 15, figs 19–20), '...Holotypus, Shetland.'; Sims (1996: 32–33, pl. 8, fig. 1, 2 images).
Note: Bukhtiyarova & Round (1996: 27) place this taxon in *Psammothidium saccula* (J.R. Carter) Bukht. & Round.
- A. *sonyda*** J.R. Carter in Hartley 1986: 606 = *A. parallela* Carter non *A. parallela* Castr. (1886).
- A. *sphacelata*** J.R. Carter 1970b: 611, pl. 1, figs 41–44.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 143, taf. 67, figs 10–13), 'Holotypenpräp. BM 77780'.
- A. *sumara*** J.R. Carter 1966: 447, pl. 1, figs 21–22.
Holotype: BM 77586.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 1. Pigbite, stones in running water at sea level.'
Note: As *Achnanthes petersenii* Hust. in Lange-Bertalot & Krammer (1989: 117).
- A. *sutura*** J.R. Carter 1970b: 611, pl. 1, figs 39–40.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 145, 149, taf. 21, figs 4–4'), '...Typenpräp. BM 77780' as *Achnanthes subatomoides* (Hust.) Lange-Bert. & R.E.M. Archibald.
- A. *taiaensis*** J.R. Carter & Denny 1982: 288, pl. 1, figs 11–15.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 150, taf. 67, figs 25–28), 'Holotypus, BM 78107, Sierra Leone'.
- A. *tuma*** J.R. Carter 1970b: 612, pl. 1, figs 35–36.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 154, taf. 67, figs 14–18), 'Holotypenpräp. BM 77780'.
- A. *umara*** J.R. Carter 1970b: 612, pl. 2, figs 1–2.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 145, 154, taf. 21, figs 3–3'), '...Typenpräp. BM 77780' as *Achnanthes subatomoides* (Hust.) Lange-Bert. & R.E.M. Archibald; Sims (1996: 32–33, pl. 8, fig. 13, 4 images).
- A. *wickenensis*** J.R. Carter 1963: 199, pl. 1, fig. 1.
Holotype?: Slides in Quekett Microscopical Society Collections.
Lectotype: BM 93539 = Carter 2591 (see below).
Locality: 'Found very sparingly in Wicken Lode. Fresh water July.'
Additional illustrations: Lange-Bertalot & Krammer (1989: 122, 156, taf. 41, figs 17–17'), '...Coll. Carter 3591 [sic, 2591] "Wicken", as *Achnanthes ploensis* var. *gessneri* (Hust.) Lange-Bert.; Sims (1996: 32–33, pl. 8, fig. 14, 2 images).
Note: There are four slides in Carter's BM collection which may also be type material: BM 93586, 'Wicken Lode, Cambs'. BM 93587, 'Wicken Lode, Cambs', BM 93588, 'Wicken Lode, Cambs', BM 93539, 'Wicken Lode, 2591a.'
- Amphora*** Ehrenb. ex Kütz. 1844
- A. *eximia*** J.R. Carter in Haworth 1974: 48, figs 3, 14.
Holotype: BM 77902.
Locality: 'Loch Leven, 20cm.'
Additional illustrations: Sims (1996: 52–53, pl. 18, figs 8–9, 5 images).
- A. *incurvata*** J.R. Carter 1966: 448, pl. 3, figs 29–31.
Holotype: BM 77593.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae...Sample no. 8. Salt beach at sea level.'
- Anomoeneis*** E. Pfitzer 1871
- A. *serians*** var. *brachysira* f. *minuta* J.R. Carter 1961d: 75, fig. 13.
Holotype: Not given
Locality: '...from the bed of Loch na Cuilic.'
Note: There are a number of slides in the collection from this locality. A possible lectotype is BM 93364, which is the sample cleaned by Mr S. Meakin which 'he has separated the very light forms' (Carter 1961d: 74) although in Carter's notebook there is no mention of a new form in relation to this slide. Another possible lectotype is BM 93297-8. These are the slides Carter prepared from the cleaned material and in his notebook he wrote 'list for publication...list sent 17/6/61.' The list does not include f. *minuta* but does note the occurrence of a new variety.
- Asterionella*** Hassall 1850
- A. *contorta*** J.R. Carter & Denny 1987: 234, pl. 1, figs 7–8.
Holotype: BM 81159.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 68 (16th April 1976)...Phytoplankton horizontal haul...Lake Mape.'
- Berkella*** R. Ross & P.A. Sims 1978
- B. *alpina*** J.R. Carter ex D.M. Williams *nov. sp.*
Description: In Carter (1993a: 106, figs 24–25).
Holotype: BM 94636 = Carter no. 3462. As *Berkella alpina* (Amossé) J.R. Carter in Carter (1993a: 106, figs 24–25) and *Berkella spicula* (Amossé) J.R. Carter in J.R. Carter & Bailey-Watts (1981: 539, pl. 2, fig. 38, pl. 24, fig. 12).
Locality: 'Ettrick Valley, S. Scotland; August 1974.'
Additional illustrations: Sims (1996: 84–85, figs 8–15, 16 images as *Berkella spicula* var. *alpina* Amossé); Krammer & Lange-Bertalot (1986: 634, fig. 7), 'Shetlands, Pr. Carter') as *Frustulia spicula* Amossé.
Notes: Ross & Sims (1978: 156) described the new genus *Berkella* R. Ross & P.A. Sims basing it on specimens of *B. linearis* R. Ross

& P.A. Sims, discovered in Loch Poit na h'I. Mull, Scotland. Although they write that their species 'was first described by Amossé under the name *Frustulia spicula* var. *alpina*...' his name was invalid as 'he did not designate a type'. They continue: '[we have] adopted a new epithet to make it quite clear that we are not basing our species on Amossé's variety' (Ross & Sims, 1978: 158). Carter concluded, after examination of a variety of specimens, that *Frustulia spicula* var. *alpina* was indeed another species of *Berkella*, distinct from *B. linearis*. Carter described his *Berkella alpina* as a new combination but as *Frustulia spicula* var. *alpina* had no designated type, it should have been described as a new species.

***Caloneis* Cleve 1894**

***C. borealis* J.R. Carter 1971a: 660, pl. 1, figs 1–3.**

Syntypes: BM 77777–8.

Locality: 'Devil's Hole Cave. '...Kincaig Hill at the south-western extremity of Kilconquhar parish, Fife...collected by the late Mr. Geo. West of University College, Dundee, in the second decade of this century [1920s].'

Additional illustrations: Sims (1996: 96–97, pl. 40, figs 9–10, 6 images).

***C. continua* J.R. Carter 1964: 225, pl. 2, fig. 9.**

Holotype?: Slides in Quekett Microscopical Society Collections.

Locality: 'Loch Maben Dumfriesshire, fresh water, seemingly somewhat rare.'

Note: There are nine slides in Carter's BM collection which may be type material: BM 92993, 'Loch Maben, 2204', BM 93261, 'Loch Maben, Mud, 2371', BM 93262, 'Mabon, 2371A, BM 93263, 'Loch Maben, Mud, 2371C', BM 93264, 'Loch Maben, 2371P', BM 93265, 'Loch Maben, 2371R', BM 93282, 'Loch Maben, Mud, 2387', BM 93569, 'Loch Maben, 2612, BM 93570, 'Loch Maben, 2613'.

***C. inliberalis* J.R. Carter & Denny 1992: 164, pl. 1, fig. 23.**

Holotype: BM 81522.

Locality: 'Lake Popei...sample 54 [Sierra Leone].'

***C. lauta* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 540, pl. 23, figs 6, 8.**

Holotype: 'collection Carter, Shet. 11.' = BM 87928.

Locality: 'In Burga Water, Shetland.'

Additional illustrations: Krammer & Lange-Bertalot (1986: 389, taf. 173, fig. 3), 'Holotypus Shetlands, Burga Water, Coll. Carter'; Sims (1996: 100–101, pl. 42, fig. 8, 4 images).

***C. lepidiformis* J.R. Carter & Denny 1987: 235, pl. 1, fig. 12.**

Holotype: BM 81147.

Locality: '...coastal strip of South-Western Sierra Leone...Sample 5 (18th Feb. 1976)...Periplankton scraped from *Vossia* stems... Lake Mape.'

***C. liophilla* J.R. Carter 1966: 448, pl. 8, fig. 20.**

Holotype: BM 77599.

Locality: 'In aquis dulcibus insula Gough Island ...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'

***C. toxa* J.R. Carter 1966: 449, pl. 2, fig. 19.**

Holotype: BM 77595.

Locality: 'In aquis dulcibus insulae Tristan da Cunha...Sample No. 10. New lava field, stream and moss.'

***C. transepta* J.R. Carter 1966: 449, pl. 2, fig. 18.**

Holotype: BM 77595.

Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 10. New lava field, stream and moss.'

***Cocconeis* Ehrenb. 1837**

***C. confusa* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 542, pl. 3, fig. 34.**

Holotype: 'collection Carter, Shet. No. 54a.' = BM 87963.

Locality: 'In Hevdadale Water, Shetland.'

Additional illustrations: Lange-Bertalot & Krammer (1989: 72, taf. 67, figs 34–34'), '...Holotypus, Coll. Carter [Shet.] 54A, Hevdadale/Shetland' as *Achnanthes johncarteri* Lange-Bert.; Krammer & Lange-Bertalot (1991a: taf. 18, figs 22–23) as *Achnanthes johncarteri* Lange-Bert., '...Holotypus, Shetland'; Sims (1996: 118–119, pl. 51, fig. 4, 2 images).

***C. diversa* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 544, pl. 3, fig. 33.**

Holotype: 'collection Carter, Shet. No. 22.' = BM 87939.

Locality: 'In Spiggie Loch, Shetland.'

Additional illustrations: Lange-Bertalot (1989: 130, taf. 70, figs 2–2'), '...Holotypus, Coll. Carter Shet. 22, Spiggie Loch' as *Achnanthes reversa* Lange-Bert. & Krammer; Krammer & Lange-Bertalot (1991a: taf. 18, figs 20–21) as *Achnanthes reversa* Lange-Bert. & Krammer, '...Holotypus, Shetland'; Sims (1996: 118–119, pl. 51, fig. 13, 2 images).

Note: Bukhtiyarova & Round (1996: 23) place this taxon in *Psammothidium reversum* (Lange-Bert. & Krammer) Bukht. & Round.

***C. leonis* J.R. Carter & Denny 1987: 236, pl. 1, fig. 14.**

Holotype: BM 81147.

Locality: '...coastal strip of South-Western Sierra Leone...Sample 5 (18th Feb. 1976)...Periplankton scraped from *Vossia* stems... Lake Mape.'

***C. toxa* J.R. Carter & Denny 1987: 236, pl. 1, figs 16–17.**

Holotype: BM 81154.

Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'

***Cyclotella* (Kütz.) Bréb. 1838**

***C. bastowii* J.R. Carter 1961d: 75, fig. 7.**

Holotype: Not given.

Locality: '...from the bed of Loch na Cuilic.'

Notes: There are a number of slides from Loch na Cuilic in Carter's collection. The most likely lectotype is slide 2457 in Carter's collection (BM 93364, 'Loch na Cuilic, 2457'). In Carter's notebook entry for sample 2457 he notes '[new] *Cyclotella*' with a slide finder reference number. Thus it would seem that sample 2457 was type material. The entry has been crossed out in pencil with the words 'slide broken' added. BM 93364 is a strewn slide that happens to be broken. The break is on the glass slide and appears not to have damaged the coverslip. However, the slide has been mended with adhesive tape, which harbours a faint impression of a coverslip suggesting that the existing coverslip was moved or re-mounted after the break occurred. One other slide made from Carter's 2457 material (BM 93365) is a selected slide with no specimens of *Cyclotella*.

***C. cyclopuncta* Håk. & J.R. Carter 1990: 155, figs 6–8.**

Holotype: Carter Collection no. 4112 [=BM 95423].

Locality: 'Plitvicer See, tree-trunk.'

Additional illustrations: Håkansson in Krammer & Lange-Bertalot (1991b: taf. 51, figs 10–14), 'Baumstamm, Plitvicer See, Typenmaterial.'

***C. delicatissima* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 545, pl. 4, fig. 14A.**

- Holotype*: 'collection Carter, Shet. No. 32a.' = BM 87945.
Locality: 'In Mussell Loch, Shetland.'
Additional illustrations: Sims (1996: 132–133, pl. 58, fig. 5, 1 image).
- C. minima** H.G. Barber & J.R. Carter 1970: 272, figs 8–9.
Holotype?: 'Typus in collectione Quekett Microscopical Club.'
Locality: '...fossil diatomaceous earth situated in Gordon Road, Auckland, New Zealand at co-ordinates 225,110E, 656,720N, Square G.7 of New Zealand M.S. 17, 1962 Edition 'Auckland'.'
- C. stelligeroides f. irregularis** J.R. Carter 1966: 450, pl. 8, fig. 17.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insulae Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- Cymbella** C. Agardh 1830
- C. citrus** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 548, pl. 6, figs 26–29.
Holotype: 'collection Carter, Shet. No. 42b.' = BM 87952.
Locality: 'Loch, west of Funzie, Shetland.'
Additional illustrations: Krammer & Lange-Bertalot (1985: 23, taf. 8, figs 9–11), 'Typenpräparat Carter 428/1978 [sic, 42 b], Shetlands', as *Cymbella amphicephala* var. *citrus* (J.R. Carter in J.R. Carter & Bailey-Watts) Krammer; Krammer & Lange-Bertalot (1986: 335, taf. 142, figs 15–16), 'Typenpräp. Shetlands, Coll. Carter 42 B/1978', as *Cymbella amphicephala* var. *citrus* (J.R. Carter in J.R. Carter & Bailey-Watts) Krammer; Sims (1996: 140–141, pl. 64, fig. 2, 3 images).
- C. diavola** J.R. Carter 1971a: 662, pl. 1, figs 6–8.
Syntypes: BM 77777–8.
Locality: 'Devil's Hole Cave. ' '...Kincraig Hill at the south-western extremity of Kilconquhar parish, Fife...collected by the late Mr. Geo. West of University College, Dundee, in the second decade of this century [1920s].'
Additional illustrations: Krammer & Lange-Bertalot (1985: 26, taf. 6, fig. 16), 'Isotypus...', as *Cymbella falaisensis* (Grunow) Krammer & Lange-Bert.; Krammer & Lange-Bertalot (1986: taf. 134, fig. 19), 'Typenpräp...' as *Cymbella falaisensis* (Grunow) Krammer & Lange-Bert.
Note: As *Encyonopsis falaisensis* (Grunow) Krammer in Krammer (1997b: 116).
- C. difficilis f. capitata** J.R. Carter & Denny 1992: 167, pl. 1, figs 42–43.
Holotype: BM 81522.
Locality: 'Lake Popei...sample 54 [Sierra Leone].'
- C. ioica** J.R. Carter & Denny 1982: 291, pl. 2, fig. 43.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- C. lembus** J.R. Carter & Denny 1992: 167, pl. 1, fig. 44, pl. 2, fig. 12.
Holotype: BM 81506.
Locality: 'In sample 3, a stream near Lake Sonfon [Sierra Leone].'
- C. umara** J.R. Carter & Denny 1982: 291, pl. 1, fig. 40.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
Additional illustrations: In Krammer (1997a: taf. 97, fig. 10), reproduction of Carter & Denny (1982: pl. 1, fig. 40).
Note: As *Encyonema umara* (J.R. Carter & Denny) Krammer in Krammer (1997b: 83).
- Diploneis** Ehrenb. ex Cleve 1894
- D. volsella** J.R. Carter & Denny 1987: 239, pl. 1, fig. 36.
Holotype: BM 81157.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 67 (3rd April 1976)...Phytoplankton horizontal haul near Bandako...River Malen.'
- Eunotia** Ehrenb. 1837
- E. ambigua** J.R. Carter 1966: 451, pl. 2, figs 11–15, 20.
Holotype: BM 77587.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae...Sample No. 2. Above Burntwood, stream at 1800 feet above sea level.'
- E. cantica** J.R. Carter & Denny 1992: 171, pl. 3, fig. 26.
Holotype: BM 81507.
Locality: 'In sample 4... [Sonfon swamp, Sierra Leone].'
- E. diverta** J.R. Carter 1966: 452, pl. 9, figs 6–7.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- E. germainii** J.R. Carter 1990: 14, pl. 1, figs 1–56.
Holotype: 'BM 81621' (sic) = BM 81622.
Locality: 'In Avoca, Hibernia, inventa...Avoca, County Wicklow, Irish Free State...June 1975...'
Additional illustrations: Sims (1996: 206–207, figs 2–6, 27 images).
- E. incurva** J.R. Carter 1966: 453, pl. 2, figs 7–8, 16.
Syntypes: BM 77591–2.
Locality: 'In aquis dulcibus insulae Tristan da Cunha...Sample No. 6. Crater Lake on moss, 6500 feet above sea level.' [BM 77591] 'Sample No. 7. As number 6 but on algae.' [BM 77592].
- E. johncarterii** D.M. Williams, *nom. nov.* = *E. pectinoides* J.R. Carter (1966: 454, pl. 9, figs 4–5) non *E. pectinoides* Zimmermann (1915: 35, fig. 9).
- E. marginistriata** J.R. Carter & Denny 1992: 172, pl. 3, figs 13–14.
Holotype: BM 81509.
Locality: 'In sample 5 [Lake Sonfon, stream, Sierra Leone].'
- E. morbida** J.R. Carter 1966: 453, pl. 9, figs 23–24.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- E. pectinoides** J.R. Carter 1966: 454, pl. 9, figs 4–5, 22.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island ...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
Notes: non *E. pectinoides* Zimmermann (1915); see *E. johncarterii* D.M. Williams, *nom. nov.*
- E. pirla** J.R. Carter & Flower 1988: 2, figs 17–48, 51–53, 55–56, 57–62.
Holotype: BM 17870, Kützing coll. 'Pitchdale, Trinidad, ex Kruger, Kutz. 29'.
Syntypes: BM 81400–2, BM 95889.
Locality: 'Woolmer Pond, a strongly acid pool in Hampshire, England...'
Additional illustrations: Krammer & Lange-Bertalot (1991a: 556, taf. 163, figs 8–13), ('Typenmaterial, Coll. Carter 5415 [sic,

- = 4514], Woolmer Pond/East Hampshire' = BM 95889) as *E. veneris* (Kütz.) De Toni.
- E. rica** J.R. Carter & Denny 1987: 240, pl. 2, figs 9–10.
Holotype: BM 81157.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 67 (3rd April 1976)...Phytoplankton horizontal haul near Bandako...River Malen.'
- E. testula** J.R. Carter & Denny 1987: 242, pl. 2, fig. 14.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- Fragilaria** Lyngb. 1819
- F. brevistriata** f. *australis* J.R. Carter 1966: 454, pl. 7, fig. 10.
Holotype: BM 77593.
Locality: 'In aquis dulcibus insulae Tristan da Cunha...Sample No. 8. Salt beach at sea level.'
- F. taiaensis** J.R. Carter & Denny 1982: 296, pl. 3, fig. 82.
Holotype: BM 78110.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from submerged wood.'
- F. telum** J.R. Carter & Denny 1987: 243, pl. 11, fig. 25.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- Gomphonema** C. Agardh 1824
- G. asymmetricum** J.R. Carter 1966: 455, pl. 6, figs 8–10, 17.
Holotype: BM 77595.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae...Sample No. 10. New lava field, stream and moss.'
Note: non *G. asymmetricum* Gutw. (1890: 28, pl. 1, fig. 24). See *G. johncarterii* D.M. Williams, *nov. nom.*
- G. dintara** J.R. Carter & Denny 1982: 298, pl. 3, figs 100–102.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- G. johncarterii** D.M. Williams, *nov. nom.* = *G. asymmetricum* J.R. Carter (1966: 455–456, pl. 6, figs 8–10, 17) non *G. asymmetricum* Gutw. (1890: 28, pl. 1, fig. 24).
- G. invidia** J.R. Carter & Denny 1982: 298, pl. 3, figs 94–95.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- G. parvulissima** J.R. Carter 1970b: 616, pl. 3, figs 10–12.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Lloris which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
- G. spatulum** J.R. Carter 1966: 456, pl. 6, fig. 12, pl. 7, fig. 23.
Holotype: BM 77590.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- G. subula** J.R. Carter & Denny 1982: 299, pl. 4, fig. 107.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- G. taiaensis** J.R. Carter & Denny 1982: 299, pl. 3, figs 97–99.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- G. tholus** J.R. Carter & Denny 1992: 177, pl. 4, figs 12–13.
Holotype: BM 81506.
Locality: 'In sample 3 [Lake Sonfon, Sierra Leone].'
- Gomphonitzschia** Grunow 1868
- G. taiaensis** J.R. Carter & Denny 1982: 300, pl. 4, fig. 108.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- Gyrosigma** Hassall 1845
- G. algoris** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 569, pl. 10, figs 6–8.
Holotype: 'collection Carter, Shet. No. 4b.' = BM 87922.
Locality: 'In Moo Water, Shetland.'
Additional illustrations: Krammer & Lange-Bertalot (1986: taf. 116, fig. 1), 'Syntypus, Shetlands' as *G. obscurum* (W. Sm.) J.W. Griff. & Henfr.; Sterrenberg (1993: 450, figs 5, 8, 10–13, '...type material, Moo Waters, Shetland...'); Sims (1996: 244–245, pl. 114, fig. 3, 2 images).
- Krasskella** R. Ross & P.A. Sims 1978
- K. hyalina** J.R. Carter & Denny 1992: 178, pl. 4, figs 15–15a.
Holotype: BM 81509.
Locality: 'Rarely in sample 5 [Lake Sonfon, stream, Sierra Leone].'
- Melosira** C. Agardh 1824
- M. dispersa** J.R. Carter 1966: 457, pl. 8, fig. 16.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- M. incorrupta** J.R. Carter 1966: 458, pl. 8, fig. 18.
Syntypes: BM 77599–77600.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.' [BM 77599] 'Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.' [BM 77600].
- M. johncarterii** D.M. Williams, *nov. nom.* = *M. setosa* J.R. Carter (1966: 458, pl. 9, figs 12–14) non *M. setosa* Grev. (1866: 436, pl. 6, figs 17–19).
- M. setosa** J.R. Carter 1966: 458, pl. 9, figs 12–14.
Syntypes: BM 77599–600.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.' [BM 77599] 'Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.' [BM 77600].
Note: non *M. setosa* Grev. (1866: 436, pl. 6, figs 17–19), see *Melosira johncarterii*.
- M. transitus** J.R. Carter & Denny 1987: 247, pl. 4, fig. 9.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- Navicula** Bory 1822
- N. abica** J.R. Carter 1966: 458, pl. 9, fig. 9.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11. Gough Island sample 1003, Cave Bell Rocks, sea level.'

- N. amerinda* J.R. Carter 1966: 459, pl. 3, figs 1–6.
Holotype: BM 77586.
Locality: ‘In aquis dulcibus insulae Tristan da Cunha...Sample No. 1. Pigbite, stones in running water at sea level.’
- N. anca* J.R. Carter 1964: 227, pl. 2, fig. 15.
Holotype: Not given.
Locality: ‘Several lochs in the southern Scottish Uplands.’
- N. armata* J.R. Carter 1964: 228, pl. 2, fig. 16.
Holotype: Not given.
Lectotype: BM 92964 (‘Rubens Law, 2188, April, 1953’). This slide is the only one that Carter refers to in his index.
Locality: ‘Growing in wet vegetation on the cliffs, Bewickshire.’
Additional illustrations: Sims (1996: 278–279, pl. 131, fig. 3, 2 images).
- N. arvensiformis* J.R. Carter 1970b: 617, pl. 2, fig. 18.
Holotype: BM 77782.
Locality: ‘Sample No. 4 from a clear stream near Soldeu...collected by Mr. J. Broadhead during the summer of 1966 and 1967.’
- N. aspergilla* J.R. Carter & Denny 1992: 181, pl. 6, figs 1–5.
Holotype: BM 81509.
Locality: ‘In sample 5 quite commonly [Lake Sonfon, stream, Sierra Leone].’
- N. bacillum* f. *delicatula* J.R. Carter & Denny 1982: 302, pl. 5, fig. 175.
Holotype: Not given.
Locality: Not given.
Note: This taxon should belong in the genus *Sellaphora* Mereschk.
- N. belsesiensis* J.R. Carter 1984: 134, figs 5–7a.
Holotype: BM 81188.
Locality: ‘...small ditch near Belses on the Scottish side of the Border.’
- N. bintila* J.R. Carter & Denny 1982: 302, pl. 6, fig. 190.
Holotype: BM 78111.
Locality: ‘River Jong (Taia) at Njala [Sierra Leone]...from stones.’
- N. bottnica* f. *acuta* J.R. Carter & Denny 1992: 181, pl. 5, fig. 2.
Holotype: BM 81508.
Locality: ‘...in sample 4...[Lake Sonfon, Sierra Leone]’
- N. brockmannii* f. *concava* J.R. Carter 1966: 460, pl. 3, fig. 14.
Holotype: BM 77590.
Locality: ‘Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.’
- N. caenosus* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 574, pl. 11, fig. 41.
Holotype: ‘collection Carter, Shet. No. 16a.’ = BM 87933.
Locality: ‘In Houlma Water, Shetland.’
Additional illustrations: Sims (1996: 282–283, pl. 133, fig. 5, 2 images; 356–357, pl. 170, fig. 11, 1 image).
- N. carterii* VanLand. (1975: 2520) see *N. dispersa* J.R. Carter.
- N. chaspula* J.R. Carter & Denny 1982: 304, pl. 6, fig. 191.
Syntypes: BM 78108, BM 78112.
Locality: ‘River Jong (Taia) at Njala [Sierra Leone]...from phytoplankton.’ [BM 78108] ‘River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.’ [BM 78112].
- N. claytoni* J.R. Carter 1987: 633, figs 1–10.
Syntypes: BM 81413–4.
Locality: ‘In Gala Water inventa...In February 1986 Mr John Clayton...took a sample of diatoms from the tributary of the River Tweed, the Gala Water.’
Additional illustrations: Sims (1996: 284–285, pl. 134, fig. 5, 2 images).
- N. cocconoides* J.R. Carter 1964: 227, pl. 2, fig. 13.
Holotype?: Slides in Quekett Microscopical Society Collections.
Syntypes: BM 93582, ‘Madingly Brick Pit, Cambridge, 2622, 5/63’; BM 93794, ‘Maddingly, Brick Pit, on Liverworts, 2777, 5/63.’
Locality: ‘Madingly Brick Pit, Cambridge.’
Additional illustrations: Sims (1996: 286–287, pl. 135, fig. 2, 1 image).
Notes: non *Navicula cocconeoides* (Rabenh.) Ralfs in A. Pritch. (1861: 909). Although the spelling of the specific epithet for Carter’s taxon is similar to that of Ralfs, the two taxa would be hard to confuse. While there may be justification in re-naming Carter’s taxon, we have chosen to retain it.
- N. concentrica* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 576, pl. 11, fig. 7.
Holotype: ‘collection Carter, Shet. No. 2.’ = BM 87920.
Locality: ‘In Blister Punds, Shetland and several other locations.’
Additional illustrations: Sims (1996: 286–287, pl. 135, fig. 6, 3 images).
Note: non *N. concentrica* Bailey (1844: 139, pl. 3, figs 13–15). Inspection of Bailey’s illustrations of his *Navicula concentrica* clearly show specimens of *Goniothecium* Ehrenb. while Carter’s *Navicula concentrica* is certainly a species of *Navicula sensu stricto*. Nevertheless, Bailey’s name still has priority hence Carter’s taxon is renamed here as *Navicula johncarterii* D.M. Williams, *nov. nom.*
- N. crepitacula* J.R. Carter & Denny 1982: 304, pl. 6, fig. 189.
Holotype: BM 78111.
Locality: ‘River Jong (Taia) at Njala [Sierra Leone]...from stones.’
- N. cuvella* J.R. Carter & Denny 1982: 306, pl. 6, figs 193–194, 218.
Holotype: BM 78108.
Locality: ‘River Jong (Taia) at Njala [Sierra Leone]...from phytoplankton.’
- N. decissa* J.R. Carter 1966: 461, pl. 3, fig. 11.
Holotype: BM 77587.
Locality: ‘In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 2. Above Burntwood, stream at 1800 feet above sea level’.
- N. dispersa* J.R. Carter 1964: 225, pl. 2, fig. 10.
Holotype?: Slides in Quekett Microscopical Society Collections.
Locality: ‘Loch Hempton in the peat, fresh water, not common.’
Additional illustrations: Sims (1996: 282–283, pl. 133, fig. 12, 1 image).
Note: *N. carterii* VanLand. (1975: 2520) = *N. dispersa* J.R. Carter non *N. dispersa* Grove & Sturt (1887: 132, pl. 10, fig. 10) nec *N. dispersa* Manguin (1942: 137, pl. 2, fig. 32). Should the Quekett slides not materialize then BM 93597 will be a suitable lectotype: ‘Loch Hempton, on Weed, 2625, 5/63, *Navicula carterii*.’
- N. diverta* J.R. Carter 1966: 461, pl. 3, figs 19–20.
Holotype: BM 77591.
Locality: ‘In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 6. Crater Lake on moss, 6500 feet above sea level.’
- N. eidrigiana* J.R. Carter 1979: 78, figs 58–64, 70–72.
Holotype: BM 78083.

- Locality*: 'Loch Eidrig, south west Scotland...' (Carter, 1979: 78).
Additional illustrations: Sims (1996: 296–297, fig. 1, 9 images); Lange-Bertalot (2001: 34, pl. 43, figs 1–6).
- N. friska*** J.R. Carter 1966: 462, pl. 3, figs 7–10.
Syntypes: BM 77587-8.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 2. Above Burntwood, stream at 1800 feet above sea level.' [BM 77587] 'Sample No. 3. As number 2 but a little upstream in a pool' [BM 77588].
- N. glomus*** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 578, pl. 13, fig. 17.
Holotype: 'collection Carter, Shet. No. 39a' = BM 87950.
Locality: 'At Burkwel, Shetland.'
Additional illustrations: Krammer & Lange-Bertalot (1986: taf. 71, fig. 39), 'Typenpräg. Coll. Carter Shetland 39 a.'
- N. gralana*** J.R. Carter & Denny 1982: 306, pl. 6, fig. 195.
Holotype: BM 78108.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from phytoplankton.'
- N. insepia*** J.R. Carter & Denny 1982: 307, pl. 6, figs 197–198.
Holotype: BM 78108.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from phytoplankton.'
- N. inexpectans*** J.R. Carter 1964: 227, pl. 2, fig. 12.
Holotype?: Slides in Quekett Microscopical Society Collections.
Locality: 'Loch Mochrum fresh water as isolated cells.'
Additional illustration: Sims (1996: 308–309, pl. 146, fig. 10, 1 image).
Note: Two additional slides in the Carter collection may be type material: BM 93573, 'Loch Mochrum, on stones, 2616, 5/63'; BM 93578, 'Loch Mochrum, mud, 2619, 5/63.'
- N. involata*** J.R. Carter & Denny 1982: 307, pl. 6, fig. 199.
Syntypes: BM 78111-2.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.' [BM 78111] 'River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.' [BM 78112].
- N. johncarterii*** D.M. Williams, *nov. nom.* = *N. concentrica* J.R. Carter in J.R. Carter & Bailey-Watts (1981: 576, pl. 11, fig. 7) non *N. concentrica* Bailey (1844: 139, pl. 3, figs 13–15).
- N. laevissima*** var. *semi-aperta* H.G. Barber & J.R. Carter 1971b: 82, fig. 97.
Holotype?: 'Typus in collectione Quekett Microscopical Club.'
Locality: '...fossil diatomaceous earth situated in Gordon Road, Auckland, New Zealand at co-ordinates 225,110E, 656,720N, Square G.7 of New Zealand M.S. 17, 1962 Edition 'Auckland'.'
Note: This taxon should belong in the genus *Sellaphora* Mereschk.
- N. lapila*** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 582, pl. 14, figs 34–35.
Holotype: 'collection Carter, Shet. No. 4' = BM 87922.
Locality: 'In Moo Water, Shetland.'
Additional illustration: Sims (1996: 310–311, pl. 147, fig. 14, 1 image).
- N. lapsa*** J.R. Carter & Denny 1992: 184, pl. 5, figs 11–15.
Holotype: BM 81509.
Locality: 'In sample 5 [Lake Sonfon, stream, Sierra Leone].'
- N. lupula*** J.R. Carter & Denny 1982: 308, pl. 6, fig. 200.
Holotype: BM 78112.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.'
- N. lurinda*** J.R. Carter & Denny 1982: 308, pl. 6, fig. 201.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. malica*** J.R. Carter & Denny 1982: 308, pl. 6, figs 202–204.
Syntypes: BM 78107-8.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.' [BM 78107] 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.' [BM 78108].
- N. menda*** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 582, pl. 24, fig. 27.
Holotype: 'collection Carter, Shet. No. 12' = BM 87929.
Locality: 'In Voxterby, Shetland.'
Additional illustrations: Sims (1996: 312–313, pl. 150, fig. 2, 2 images).
Notes: Haworth & Offer (1986: 446) suggested two further slides as lectotypes '[B]ecause the original description is based upon just one specimen...'. This reason is not a valid justification for the designation of lectotype material as Carter did identify the holotype slide and that has to remain so, regardless of how many specimens were consulted for the description. The two slides suggested by Haworth & Offer (BM 81209-10) may act as useful, additional non-type examples.
- N. mintracta*** J.R. Carter & Denny 1982: 309, pl. 6, fig. 205.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- N. nabrona*** J.R. Carter & Denny 1982: 309, pl. 6, fig. 206.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. nabrona*** f. *ovalis* J.R. Carter & Denny 1982: 309, pl. 6, fig. 207.
Holotype: Not given.
Locality: Not given.
Lectotype: BM 78107 ('River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.').
Note: Carter writes 'occurs mixed with the type.' This seems to suggest that BM 78107 is the most suitable lectotype.
- N. nienta*** J.R. Carter 1966: 464, pl. 3, fig. 17.
Holotype: BM 77590.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- N. nutata*** J.R. Carter & Denny 1982: 309, pl. 6, figs 208–210.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- N. orbita*** J.R. Carter 1966: 464, pl. 3, fig. 12.
Holotype: BM 77594.
Locality: 'In aquis dulcibus insulae Tristan da Cunha dictae... Sample No. 9. Hottentot Gulch, stream pool, 2000 feet above sea level.'
- N. orbis*** J.R. Carter in J.R. Carter & Bailey-Watts 1981: 584, pl. 24, fig. 34.
Holotype: 'collection Carter, Shet. No. 39a' = BM 87950.
Locality: 'At Burkwel, Shetland.'
Additional illustration: Sims (1996: 320–321, pl. 152, fig. 11, 1 image).

- N. patrina* J.R. Carter & Denny 1982: 310, pl. 6, fig. 211.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- N. perfidissima* Lange-Bert. in Lange-Bertalot & Krammer (1989: 162, taf. 70, figs 22–25', ?26, 27).
Holotype: BM 93708 = Carter 2716, 'Devils Hole (Tay Dist.) West Coll. A.W. Round no. 35' (Carter, 1971a: 659, *Achnanthes perfida*), two specimens marked (Lange-Bertalot & Krammer, 1989: taf. 70, figs 22–25), 'Als *Achnanthes perfida* Carter in Coll. Carter 2716, Devil's Hole/Schottland.' BM 93708 is not type material of *A. perfida*, see above.
- N. petilina* J.R. Carter & Denny 1982: 310, pl. 6, fig. 212.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. pseudoclamans* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 585, pl. 14, fig. 7.
Holotype: 'collection Carter, Shet. No. 4a' = BM 87922.
Locality: 'In Moo Water, Shetland.'
Additional illustrations: Sims (1996: 328–329, pl. 156, fig. 12, 2 images).
- N. pseudomenisculus* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 585, pl. 14, fig. 8.
Holotype: 'collection Carter, Shet. No. 36' = BM 87948.
Locality: 'In Loch of Cliff, Shetland.'
Additional illustration: Sims (1996: 328–329, pl. 156, fig. 19, 1 image).
Note: non *N. pseudominiscula* Fusey (1950: 156, fig. 22). Although the spelling of the specific epithet for Carter's taxon is remarkably similar to that of Fusey, these two taxa would be hard to confuse. While there may be justification in re-naming Carter's taxon, we have chosen to retain it.
- N. pseudostundlii* H.G. Barber & J.R. Carter 1971b: 83, fig. 122.
Holotype?: 'Typus in collectione Quekett Microscopical Club.'
Locality: '...fossil diatomaceous earth situated in Gordon Road, Auckland, New Zealand at co-ordinates 225,110E, 656,720N, Square G.7 of New Zealand M.S. 17, 1962 Edition 'Auckland'.'
- N. resecta* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 586, pl. 12, fig. 55.
Holotype: 'collection Carter, Shet. No. 36' = BM 87948.
Locality: 'In Loch of Cliff, Shetland.'
Additional illustrations: Sims (1996: 336–337, pl. 160, fig. 4, 2 images).
- N. retrica* J.R. Carter & Denny 1982: 311, pl. 6, figs 214–215.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. retrocurvata* J.R. Carter ex R. Ross & P.A. Sims 1978: 159, figs 14–16.
Holotype: BM 78070.
Locality: '...ex rivulo 'on the links behind Sandside Bay, Mainland' in Orcades, J.R. Carter 3369 lectus.'
Additional illustrations: Sims (1996: 312–313, pl. 148, fig. 11, 3 images; 336–337, pl. 160, fig. 6, 2 images).
Note: = *Hippodonta lesmonensis* (Hust.) Lange-Bert., Metzeltin & Witkowski (1996: 261).
- N. riparta* J.R. Carter 1966: 465, pl. 8, fig. 19.
Holotype: BM 77599.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- N. rotesta* J.R. Carter 1970b: 620, pl. 2, figs 14, 32–33.
Holotype: BM 77783.
Locality: 'Sample No. 5 from the Rio d'Envalira...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
- N. sarolata* J.R. Carter & Denny 1982: 311, pl. 6, figs 216–217.
Holotype: Not given.
Lectotype: BM 78107.
Locality: 'A few specimens seen. 11, 20' = 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.' [Sample 11, BM 78107] 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.' [Sample 11, BM 78108]; 'River Jong (Taia) at Njala [Sierra Leone]...from stones.' [Sample 20, BM 78111].
- N. sarolata f. capitata* J.R. Carter & Denny 1992: 185, pl. 5, figs 38–39.
Holotype: BM 81506.
Locality: 'In sample 3 only [Lake Sonfon, Sierra Leone].'
- N. scalpia* J.R. Carter 1966: 466, pl. 8, fig. 15.
Holotype: BM 77600.
Locality: 'In aquis dulcibus insula Gough Island dictae...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- N. scela* J.R. Carter & Denny 1982: 312, pl. 6, figs 187–188.
Holotype: BM 78112.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.'
- N. scirpus* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 586, pl. 24, figs 29–30a.
Holotype: 'collection Carter, Shet. No. 26' = BM 87943.
Locality: 'In North Vementry, Shetland.'
Additional illustrations: Sims (1996: 340–341, pl. 162, fig. 8, 5 images).
- N. sequens* H.G. Barber & J.R. Carter 1971b: 83, fig. 110.
Holotype?: 'Typus in collectione Quekett Microscopical Club.'
Locality: '...fossil diatomaceous earth situated in Gordon Road, Auckland, New Zealand at co-ordinates 225,110E, 656,720N, Square G.7 of New Zealand M.S. 17, 1962 Edition 'Auckland'.'
- N. sponsa* J.R. Carter 1964: 226, pl. 2, fig. 11.
Holotype?: Slides in Quekett Microscopical Society Collections.
Locality: 'I have found this form in three locations in the Cheviots in every case on the surface of mud in high level springs.'
Additional illustration: Sims (1996: 344–345, pl. 164, fig. 13, 1 image).
- N. subexilissima* J.R. Carter 1970b: 620, pl. 2, fig. 13.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
- N. subvasta* J.R. Carter 1970b: 621, pl. 2, fig. 20.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
Notes: non *N. subvasta* Hust. Hustedt illustrated his *N. subvasta* in Schmidt's *Atlas* (1936: pl. 403, figs 49–50) but provided no description. While Hustedt did eventually provide a description, first he placed it under the name *Navicula rivularis* Hust. (1942:

- 112) and second, in 1945 (930, pl. 41, figs 38–40), he included it in *Navicula helensis* P. Schulz. *Navicula helensis* is now correctly referred to as *Fallacia helensis* D.G. Mann (in Round et al. 1990: 668). As neither of Hustedt's descriptions can be understood as validly published and as the illustration in Schmidt's *Atlas* is after 1908, Carter's name is the first valid use of *Navicula subvasta*.
- N. sulta* J.R. Carter & Denny 1982: 314, pl. 8, fig. 290.
Holotype: BM 78110.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from submerged wood.'
- N. suspica* J.R. Carter & Denny 1992: 186, pl. 5, fig. 45.
Holotype: BM 81522.
Locality: 'In sample 54 rarely [Lake Popei, Sierra Leone].'
- N. tauta* J.R. Carter & Denny 1982: 314, pl. 8, fig. 293.
Holotype: BM 78108.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. toxa* J.R. Carter 1960b: 284, fig. 6.
Holotype: Not given.
Lectotype: BM 92981 = Carter 2198, 'Woodhead Loch, Ancrum, Small Nav....'
Locality: 'Abundant in Woodhead Loch, Roxburghshire, usually on the surface of mud.'
- N. variolinea* J.R. Carter 1971a: 668, pl. 2, fig. 71, pl. 3, fig. 95.
Syntypes: BM 77777-8.
Locality: 'Devil's Hole Cave.' '...Kincraig Hill at the south-western extremity of Kilconquhar parish, Fife...collected by the late Mr. Geo. West of University College, Dundee, in the second decade of this century [1920s].'
Additional illustrations: Sims (1996: 350–351, pl. 167, fig. 1, 3 images).
- N. vatinata* J.R. Carter & Denny 1982: 315, pl. 5, fig. 180.
Holotype: BM 78112.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.'
- N. vincita* J.R. Carter & Denny 1982: 315, pl. 5, fig. 182.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. virosa* J.R. Carter & Denny 1992: 188, pl. 4, fig. 43.
Holotype: BM 81506.
Locality: '...in sample 3... [Lake Sonfon, Sierra Leone].'
- N. visitanda* J.R. Carter 1970b: 621, pl. 2, figs 15–16.
Holotype: BM 77780.
Locality: 'Sample No. 2 from a ditch near Llorts which is in the only side valley of the republic...collected by Mr. J. Broadhead during the summer of 1966 and 1967.'
- N. vitila* J.R. Carter & Denny 1982: 316, pl. 5, figs 176–77.
Holotype: BM 78108.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. vula* J.R. Carter 1971a: 669, pl. 2, fig. 84.
Holotype: 'Typus: praeparatum No. 2716C in collectione Carter' = BM 93709.
Locality: 'Devil's Hole Cave' '...Kincraig Hill at the south-western extremity of Kilconquhar parish, Fife...collected by the late Mr. Geo. West of University College, Dundee, in the second decade of this century [1920s].'
Additional illustrations: Sims (1996: 350–351, pl. 167, fig. 9, 2 images).
- N. wavella* J.R. Carter & Denny 1982: 316, pl. 5, fig. 178.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- N. wustula* J.R. Carter & Denny 1982: 318, pl. 5, fig. 179.
Holotype: BM 78112.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from rotting leaves.'
- N. zipila* J.R. Carter & Denny 1982: 318, pl. 5, fig. 181.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- Neidium* Pfitzer 1871
- N. juba* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 592, pl. 24, fig. 35.
Holotype: 'collection Carter, Shet. No. 39a' = BM 87950.
Locality: 'In Burkwel, Shetland.'
Additional illustrations: Krammer & Lange-Bertalot (1986: 269, taf. 99, fig. 11), 'Holotypus, Coll. Carter Shetland 39 A'; Sims (1996: 372–373, pl. 178, fig. 5, 1 image).
- N. lentis* J.R. Carter & Denny 1987: 254, pl. 5, fig. 3.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- N. miopsa* J.R. Carter & Denny 1992: 189, pl. 6, fig. 26.
Holotype: BM 81514.
Locality: 'In sample 9 rarely [Lake Sonfon, Sierra Leone].'
- N. plexum* J.R. Carter & Denny 1987: 254, pl. 5, fig. 6.
Holotype: BM 81156.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- N. popeiensis* J.R. Carter & Denny 1992: 189, pl. 6, fig. 27.
Holotype: BM 81522.
Locality: 'Not rare in sample 54... [Lake Popei, Sierra Leone].'
- N. tabletta* J.R. Carter & Denny 1992: 190, pl. 6, figs 29–30.
Holotype: BM 81522.
Locality: 'Not rarely in sample 54... [Lake Popei, Sierra Leone].'
- N. taiaensis* J.R. Carter & Denny 1982: 319, pl. 6, fig. 219.
Holotype: 'BM 7811' (sic) = BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- N. testa* J.R. Carter in J.R. Carter & Bailey-Watts 1981: 593, pl. 24, fig. 36.
Holotype: 'collection Carter, Shet. No. 66' = BM 87973.
Locality: 'At Housetter, Shetland.'
Additional illustrations: Krammer & Lange-Bertalot (1986: 268, taf. 99, fig. 10), 'Holotypus, Coll. Carter Shetland W66'; Sims (1996: 374–537, pl. 179, fig. 3, 1 image).
- Nitzschia* Hassall 1845
- N. disputata* J.R. Carter 1971a: 670, pl. 1, figs 38–40.
Syntypes: BM 77777-8.
Locality: 'Devil's Hole Cave' '...Kincraig Hill at the south-

- western extremity of Kilconquhar parish, Fife...collected by the late Mr. Geo. West of University College, Dundee, in the second decade of this century [1920s].'
Additional illustrations: Krammer & Lange-Bertalot (1988: 51, taf. 40, figs 9–15), not type material, as *N. epithemoides* var. *disputata* (J.R. Carter) Lange-Bert. in Lange-Bertalot & Krammer (1987: 16); Sims (1996: 384–385, pl. 184, fig. 1, 3 images).
- N. epressa* J.R. Carter 1966: 467, pl. 6, figs 24–25.
Holotype: BM 77590.
Locality: 'Tristan da Cunha inventa aqua dulci...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- N. inimasta* J.R. Carter & Denny 1982: 320, pl. 7, figs 230–230a.
Holotype: BM 78107.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phyto-plankton.'
- N. jamiesoni* H.G. Barber & J.R. Carter 1972: 147, fig. 207.
Holotype?: 'Typus in collectione Quekett Microscopical Club.'
Locality: '...fossil diatomaceous earth situated in Gordon Road, Auckland, New Zealand at co-ordinates 225,110E, 656,720N, Square G.7 of New Zealand M.S. 17, 1962 Edition 'Auckland'.'
- N. navia* J.R. Carter 1966: 468, pl. 7, figs 1, 7.
Holotype: BM 77593.
Locality: 'Tristan da Cunha inventa aqua dulci...Sample No. 8. Salt beach at sea level.' [BM 77593].
- N. oscilla* J.R. Carter 1966: 468, pl. 7, figs 21–22.
Holotype: BM 77589.
Locality: 'Tristan da Cunha inventa aqua dulci...Sample No. 4. Rookery Gulch, wet rock, with gelatinous algae (Nostoc sp.).'
- N. palmida* J.R. Carter 1966: 468, pl. 9, figs 27–28.
Holotype: BM 77600.
Locality: 'Gough Island inventa aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- N. petulla* J.R. Carter 1966: 469, pl. 6, figs 18–23.
Holotype: BM 77593.
Locality: 'Tristan da Cunha inventa aqua dulci...Sample No. 8. Salt beach at sea level.'
- N. pistilla* J.R. Carter 1966: 469, pl. 7, fig. 5.
Holotype: BM 77590.
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- N. rotula* J.R. Carter 1966: 470, pl. 7, fig. 19, 26.
Holotype: BM 77586.
Locality: 'Tristan da Cunha inventa aqua dulci...Sample No. 1. Pigbite, stones in running water at sea level.'
- N. salta* J.R. Carter 1966: 470, pl. 7, fig. 24.
Holotype: BM 77595.
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 10. New lava field, stream and moss.'
- N. serpentiformis* J.R. Carter 1966: 470, pl. 9, fig. 10.
Holotype: BM 77599.
Locality: 'Gough Island inventa aqua dulci...Sample No. 11. Gough Island sample 1003, Cave Bell Rocks, sea level.'
- N. sonora* J.R. Carter 1966: 470, pl. 8, figs 21–22.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- N. tantata* J.R. Carter & Denny 1992: 192, pl. 7, fig. 17.
Holotype: BM 81509.
Locality: 'In sample 5 only [Lake Sonfon, stream, Sierra Leone].'
- N. wodensis* J.R. Carter 1964: 228, pl. 2, fig. 17.
Holotype?: Slides in Quekett Microscopical Society Collections.
Locality: Woden Loch on the surface of dead wood, fresh water, not very common.'
Notes: If the Quekett slides are not available, BM 93522 ('Woden Loch, on dead wood, 2582, 9/62') would serve as lectotype.
- Opephora* P. Petit 1888
- O. taiaensis* J.R. Carter & Denny 1982: 321, pl. 5, fig. 185.
Holotype: BM 78111.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...from stones.'
- Pinnularia* Ehrenb. 1843
- P. carminata* H.G. Barber & J.R. Carter 1978: 305, text-figs p. 306.
Holotype: BM 78064.
Locality: '...inter muscos in rivulo montoso ad 'Tai Newddion, Nant Ffrancon, Gwynedd', Cambriam, Barber – Cleaning No. 537 lectus.'
Additional illustrations: Krammer (1992: 140, taf. 55, fig. 5), 'Loch Enoch, Schottland, leg. Carter. Präp. 574B, IOK'; Krammer (2000: 153, pl. 133, fig. 5), 'Loch Enoch, Schottland, leg. Carter. slide 574B IOK'; Sims (1996: 434–435, pl. 209, fig. 3, 3 images).
- P. dispersa* J.R. Carter 1966: 472, pl. 5, figs 7–9.
Holotype: BM 77593.
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 8. Salt beach at sea level.'
Note: non *P. dispersa* Østrup (1901: 273, fig. 37), see *P. johncarterii* D.M. Williams, *nov. nom.*
- P. extenda* J.R. Carter 1966: 473, pl. 4, figs 3–4.
Holotype: BM 77590.
Locality: 'Tristan da Cunha inventa in aqua dulci ...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- P. graphica* J.R. Carter & Denny 1992: 194, pl. 8, fig. 5.
Holotype: BM 81509.
Locality: 'In sample 5 only, not common [Lake Sonfon, stream, Sierra Leone].'
- P. impassa* J.R. Carter 1966: 473, pl. 4, figs 5–6.
Holotype: BM 77590.
Locality: 'Tristan da Cunha inventa in aqua dulci ...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- P. johncarterii* D.M. Williams, *nov. nom.* = *P. dispersa* J.R. Carter (1966: 472, pl. 5, fig. 7–9) non *P. dispersa* Østrup (1901: 273, fig. 37).
- P. leptosomiformis* J.R. Carter 1966: 474, pl. 8, fig. 6.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- P. mica* J.R. Carter & Denny 1987: 258, pl. 5, figs 19–22.
Holotype: 'BM 91146' (sic) = BM 81146.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...'. Periplankton scraped from *Vossia* stems...Lake Mape.'
- P. mondimia* J.R. Carter & Denny 1992: 198, pl. 8, fig. 6.
Holotype: BM 81522.
Locality: 'In sample 54... [Lake Popei, Sierra Leone].'
- P. posita* J.R. Carter 1966: 475, pl. 8, figs 7–8.

- Holotype*: BM 77599.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- P. redunda*** J.R. Carter 1966: 475, pl. 8, figs 10–11.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- P. restituta*** J.R. Carter 1966: 475, pl. 8, figs 3–5.
Holotype: BM 77599.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- P. ritarda*** J.R. Carter 1966: 476, pl. 4, fig. 21.
Holotype: 'in collectione Carter, Hawick, Scotland.' = BM 77590.
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 5. Big Waterburn, stones in stream, 100 feet above sea level.'
- P. seriata*** J.R. Carter 1966: 476, pl. 8, fig. 12.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- P. sistassa*** J.R. Carter 1966: 477, pl. 5, figs 3–6.
Syntypes: BM 77586–7.
Locality: 'Sample no. 1. Pigbite, stones in running water at sea level.' [BM 77586] 'Tristan da Cunha inventa in aqua dulci...Sample No. 2. Above Burntwood, stream at 1800 feet above sea level.' [BM 77587].
Additional illustrations: Sims (1996: 474–475, pl. 229, fig. 6, 7 images).
- P. statua*** J.R. Carter & Denny 1987: 260, pl. 8, figs 2–3, 10.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- P. subcapitata*** f. *plana* J.R. Carter 1966: 478, pl. 8, figs 2–3.
Holotype: Not given.
Lectotype: BM 77599, 'Sample 11 not rare.'
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 11 Gough Island sample 1003, Cave Bell Rocks, sea level.'
- P. suplica*** J.R. Carter & Denny 1987: 262, pl. 7, fig. 8.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- P. taiaensis*** J.R. Carter & Denny 1982: 324, pl. 8, fig. 265.
Holotype: BM 78109.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...surface Flotsam.'
- P. trudis*** J.R. Carter & Denny 1992: 199, pl. 9, fig. 11.
Holotype: BM 81508.
Locality: 'In sample 4... [Lake Sonfon, Sierra Leone].'
- P. trulla*** J.R. Carter & Denny 1987: 262, pl. 7, fig. 15.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'
- P. unca*** J.R. Carter & Denny 1987: 263, pl. 8, fig. 14.
Holotype: BM 81160.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul from near Manobotma...Lake Mape.'
- P. vacua*** J.R. Carter & Denny 1992: 196, pl. 9, fig. 7.
Holotype: BM 81521.
Locality: 'In sample 54 only [Lake Popei, Sierra Leone].'
- P. vapilla*** J.R. Carter 1966: 478, pl. 4, figs 1–2.
Syntypes: BM 77593, BM 77595.
Locality: 'Tristan da Cunha inventa in aqua dulci...Sample No. 8. Salt beach at sea level.' [BM 77593] 'Sample No. 10. New lava field, stream and moss.' [BM 77595].
- Pseudoeunotia*** Grunow in Van Heurck 1881
- P. duplex*** J.R. Carter 1966: 479, pl. 9, fig. 29.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- P. linearis*** J.R. Carter 1966: 479, pl. 9, figs 15–19.
Holotype: BM 77600.
Locality: 'Gough Island inventa in aqua dulci...Sample No. 12. Gough Island sample 1006, Stream Gonydale, 1400 feet a.s.l.'
- Stauroneis*** Ehrenb. 1843
- S. bulla*** J.R. Carter & Denny 1987: 264, pl. 9, figs 16–20, pl. 11, figs 14–15.
Holotype: BM 81160.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul from near Manobotma...Lake Mape.'
- S. capula*** J.R. Carter & Denny 1992: 200, pl. 10, fig. 10.
Holotype: BM 81511.
Locality: 'A few cells in sample 7 [Lake Sonfon, Sierra Leone].'
- S. didacta*** J.R. Carter & Denny 1992: 200, pl. 10, fig. 9.
Holotype: BM 81506.
Locality: 'Occasional in sample 3, rarely in sample 54... [Lake Sonfon, Sierra Leone].'
- S. impenda*** J.R. Carter & Denny 1992: 202, pl. 10, fig. 8.
Holotype: BM 81509.
Locality: 'In samples 5 [Lake Sonfon, Sierra Leone] and 54 [Lake Popei, Sierra Leone]... Sample 5 is holotype material, sample 54 represents syntype material.'
- S. singula*** J.R. Carter & Denny 1992: 202, pl. 10, fig. 5.
Holotype: BM 81522.
Locality: 'Not rarely in sample 54... [Lake Popei, Sierra Leone].'
- Surirella*** Turpin 1828
- S. subtilis*** J.R. Carter & Denny 1992: 204, pl. 11, fig. 6.
Holotype: BM 81522.
Locality: 'In sample 54... [Lake Popei, Sierra Leone].'
- S. taiaensis*** J.R. Carter & Denny 1982: 325, pl. 8, fig. 274.
Holotype: BM 78108.
Locality: 'River Jong (Taia) at Njala [Sierra Leone]...phytoplankton.'
- S. terebra*** J.R. Carter & Denny 1987: 268, pl. 9, fig. 30.
Holotype: BM 81154.
Locality: '...coastal strip of South-Western Sierra Leone...Sample 66 (3rd April 1976)...Phytoplankton horizontal haul...Lake Mabesi.'

Synedra Ehrenb. 1830

S. capilla J.R. Carter & Denny 1992: 204 = *S. filiformis* J.R. Carter & Denny non *S. filiformis* Grunow (1880).

S. filiformis J.R. Carter & Denny 1987: 270, pl. 9, fig. 32.

Holotype: BM 81159.

Locality: '...coastal strip of South-Western Sierra Leone...Sample 68 (16th April 1976) ... Phytoplankton horizontal haul...Lake Maape.'

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